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Proceedings of the 1997 Newfoundland Regional Shellfish Assessments

edited by

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Abstract

Regional assessments of three invertebrate species (northern shrimp (*Pandalus borealis*), snow crab (*Chionoecetes opilio*) and Iceland scallops (*Chlamys islandica*)) were conducted in February and April, 1997. A review of lobster (*Homarus americanus*) research was also conducted on October 7, 1997. These proceedings contain summaries of the working papers presented at the meeting, as well as summaries of the discussions of these papers. A list of working papers available to the meeting and a list of meeting participants are given. For northern shrimp the committee concluded that for the area as a whole (Div. 0B to 3K) the current high level of abundance is unprecedented and that the opportunity now exists for a substantial expansion of the fishery with minimal risk of over exploitation. For Iceland scallops there was no new research vessel information and the assessment relied on the evaluation of fishery data. The committee concluded that there was no evidence on which to advise a change in the TAC for 1997 with the exception of the establishment of a 800 t TAC for a new fishing area in southern 3N. For snow crab, fall bottom trawl survey data indicate a substantial exploitable biomass for 1997 throughout the offshore Div. 2J3KLN area. The fishery should continue to perform well in 1997, but area specific declines are also suggested, likely due to local variation in recruitment and exploitation levels. An analysis considered during the lobster review suggested that exploitation rate may exceed 90% without risk of recruitment overfishing. While a very high resilience to fishing is apparent, a number of considerations indicate that a more cautious interpretation of the results is warranted. A prudent conclusion is that recruitment failure is likely to occur during periods that environmental/ecological conditions affecting survival to recruitment are less than favourable.

Résumé

On a fait des évaluations régionales de trois espèces d'invertébrés [la crevette nordique (*Pandalus borealis*), le crabe des neiges (*Chionoecetes opilio*) et le pétoncle d'Islande (*Chlamys islandica*)] en février et en avril 1997. Par ailleurs, on a examiné les recherches sur le homard (*Homarus americanus*) le 7 octobre 1997. Le compte rendu renferme un sommaire des documents de travail présentés pendant la rencontre et un sommaire des discussions tenues au sujet de ces documents. On trouve également une liste des documents de travail disponibles à la réunion et une liste des participants à la rencontre. Pour ce qui est de la crevette nordique, le comité a conclu que pour l'ensemble de la région (division 0B à division 3K), le niveau d'abondance élevé actuel est sans précédent, et qu'il est maintenant possible d'élargir substantiellement la pêche en s'exposant à un risque minime de surexploitation. Quant au pétoncle d'Islande, il n'y a aucune information nouvelle fournie par des navires de recherche. L'évaluation s'est fondée sur l'évaluation des données sur la pêche. Le comité a conclu que d'après les renseignements disponibles, il n'y avait pas lieu de conseiller une modification du TAC de 1997, sauf pour l'établissement d'un TAC de 800t dans la nouvelle zone de pêche au sud de la division 3N. En ce qui concerne le crabe des neiges, les données des relevés au chalut de fond de l'automne témoignent d'une biomasse exploitable substantielle en 1997 dans l'ensemble de la zone hauturière des divisions 2J3KLN. La pêche devrait continuer d'être bonne en

1997, mais on prévoit également des diminutions dans des zones particulières susceptibles d'être causées par des variations locales des niveaux de recrutement et d'exploitation. D'après les résultats d'une analyse effectuée pendant l'examen du homard, le taux d'exploitation pourrait dépasser les 90 p. 100 sans risquer de surpêcher le potentiel reproducteur. Bien qu'il semble y avoir une très grande résilience à la pêche, certains éléments font croire qu'il y a lieu d'interpréter les résultats avec plus de prudence. Il serait prudent de conclure qu'il pourrait y avoir un échec du recrutement pendant les périodes où les conditions environnementales/écologiques qui régissent la survie jusqu'au stade du recrutement sont moins que favorables.

Introduction

Regional assessments of three invertebrate species (northern shrimp (*Pandalus borealis*), snow crab (*Chionoecetes opilio*) and Iceland scallops (*Chlamys islandica*)) were conducted in February and April, 1997. Northern shrimp are assessed as four management areas, NAFO Div. 0B, NAFO Div. 2G, Hopedale and Cartwright Channels, and Hawke Channel + NAFO Div. 3K. There is thought to be one stock of snow crab throughout the Newfoundland - Labrador area, although there are numerous management areas. Two stocks of Iceland scallop, Grand Banks (3LN) and 4R were also assessed. Lobster (*Homarus americanus*) was reviewed in October.

Data from the fall bottom trawl surveys again proved to be a valuable part of the assessments of crab and shrimp. This information will become more and more valuable as a time series is developed. The survey design and coverage may not be optimal for these species, however.

These proceedings contain summaries of the working papers presented at the meeting, as well as summaries of the discussions of these papers. The summaries of the working papers and discussions are grouped by species. The reader is directed to the stock status reports and research documents for further information on these stocks.

NEWFOUNDLAND SNOW CRAB

Summary of performance of the 1996 Newfoundland and Labrador snow crab fishery - WP SF 97/9

by

D.M. Taylor and P.G. O'keefe

Newfoundland Snow crab (*Chionoecetes opilio*) landings reached 37,816t in 1996, an increase of 18.2% over the previous year. The fishery is concentrated along the northeast and southeast coasts of Newfoundland and Labrador with a small, inshore fishery, inaugurated in 1995 operating in nearshore areas of the island. The fishery is prosecuted by several fleet sectors; these include full-time, large supplementary (>40 gross tons), small supplementary vessels (<40 gross tons) and vessels under 35 ft. In 1996 over 2600 licenses were issued to Newfoundland and Labrador fishers. Vessels are licensed by NAFO division boundaries and are restricted to fishing snow crab management areas within their division. Each year, before fishing activity commences, Resource Management Branch issues a Snow Crab Management Plan which outlines quotas per fleet sector by management area, trap limits, seasons etc.

Assessment of fishery performance for each of the various management areas relies on analyses of fishers logbook entries (mandatory for all fleet sectors) as the principle means of comparing a given years fishery performance to that of the previous fishing

season. The standard used in this comparison is catch per unit of effort (CPUE) calculated by dividing the landings for a trip by the number of traps hauled as reported in the log books. While it is felt that information obtained from most logbooks during the course of a fishery is reasonably accurate, providing reliable data on catch and effort, some management areas are problematic in terms of interpreting the information provided.

It should be noted that changes in CPUE from one year to the next may not accurately reflect abundance due to the influences of such things as environmental effects (water temperature), changing fishing patterns, changes in fishing season etc.. Comparison of 1995 and 1996 CPUE data is particularly problematic for several reasons. In 1996 a two-tiered pricing system was introduced whereby fishers were paid a higher price for crabs greater than 103mm carapace width. Also in 1996, a harvesting strategy which assigned individual quotas to fishers was applied to all fleet sectors. These factors led to a extensive high-grading in all areas except Labrador. In NAFO Division 3LNO fishers in offshore areas increased the mesh size of a large proportion of their traps. These three factors could have artificially reduced CPUE's in comparison with 1995 catch rates. In 1996 the fishery was delayed in opening due to a price dispute. This meant that much fishing activity was carried out during the hottest time of the year. The additional culling necessitated by the two-tiered price system, carried out during the hot summer months rather than the cooler spring, may have contributed to higher than average discard mortality.

In NAFO Divisions 3K and 3LNO landings and effort increased over 1995 levels while declining in Divisions 2J and 4R. In subdivision 3Ps landings increased markedly while effort remained the same, reflecting the increase in CPUE over 1995.

Logbooks have also been utilized to determine fishing positions of crab fishers with the aim of summarizing fleet fishing patterns, identifying portions of the fishing grounds that are the most heavily fished, delineating the boundaries of new fishing grounds and illustrating the expansion of the fishery in recent years both in terms of effort and area. A large sub-sample of the log book entries of full-time and supplementary fishers are entered into a computer data bank and a computer-generated map of Newfoundland and Labrador indicating these fishing positions is produced. To date, the only charts produced have been for the 1994, 1995 and 1996 fishery. We are continuing with plans to produce a full retrospective set for the period 1979-96 inclusive. Currently data are available for the period 1990-96.

WP SF 97/9 - Discussion J. Morgan

There were a number of new issues with respect to CPUE in 1996. The move to enterprise allocations has meant that the fishery is no longer as competitive, many fisherman moved from 5 1/4 to 5 1/2 inch mesh in their pots and there were a lot of new entrants into the fishery. Also, CPUE includes only landings not discards. The observer data could be examined to provide some information on discarding.

Results of 1996 Inshore/Nearshore snow crab time-series research cruises - WP SF 97/6

by

Taylor, D.M. and P.G. O'Keefe

Research vessel surveys are conducted annually in 3 snow crab management areas in NAFO Division 3L; Northeast Avalon (6C), Bonavista Bay (5A) and Conception Bay (6B) and since 1994 in White Bay (3B) in Division 3K . The surveys are carried out using both commercial crab traps (in order to emulate those used in the commercial fishery), and small-meshed traps. Traps were set at randomly selected stations stratified by depth. Weather permitting, traps were hauled after a 24h soak and sampled in order to determine catch per trap, size frequency, shell condition, and proportion small-clawed males (potential recruits). In 1996, bottom trawling with a modified shrimp trawl was initiated in all 4 survey areas. Tows of 10 minutes duration were made at a speed of 2.5 knots. Catches were sorted according to sex and sampled in the same way as were trap-caught crabs.

In recent years, it has been observed that there has been a steady decline in the proportion of small-clawed crabs in all areas which may indicate a downward trend in recruitment. This phenomenon will be monitored closely during future research surveys by means of both small-meshed traps and the modified shrimp trawl.

WP SF 97/6 - Discussion J. Morgan

The bottom trawl sets caught more small claw crab than the traps in similar areas. This may indicate that the trawl could provide a better indicator of recruitment.

Status of Newfoundland and Labrador Snow Crab in 1996 - WP SF 97/7

by

E.G. Dawe, D.M.Taylor, P.J. Veitch, H.J. Drew, P.C. Beck, and P.G. O'Keefe

Data on catch rate, size (carapace width, CW) and molt status (chela allometry) from various sources were used to infer resource status. Data from 1995 and 1996 fall bottom trawl surveys were particularly useful. The more extensive 1996 survey showed that legal-sized males were broadly distributed throughout much of the survey area but were absent north of Div. 2J, on the deep slope of the continental shelf, and across most of shallow southern Grand Bank. All crab sizes generally co-existed offshore, whereas largest crabs tended to be concentrated at greatest depths on muddy substrates in inshore areas. Fall bottom trawl surveys indicated a substantial commercial biomass for 1997 throughout Div. 2J3KLN. This was consistent with high 1996 catch rates in two of three Div. 3L trap surveys and the single Div. 3K trap survey. A decline is anticipated in one of the three Div. 3L trap survey areas (Bonavista Bay), probably due to local effects of recruitment and exploitation. The fall bottom trawl surveys indicate no problems with

recruitment in the short term throughout Div. 2J3KLN. This contrasts with local Div. 3L trap survey results, especially for Bonavista Bay and Conception Bay. In those areas trap survey catch rates of prerecruits with small claws declined to very low levels. Interpretation of differences in abundance indices of prerecruits between trap and trawl surveys remains unclear because of differences in gear efficiencies and survey design as well as in crab population structure and levels of exploitation between inshore and offshore areas. A great increase in trap survey catch rates of Prerecruit 2's in White Bay in 1996 suggests that there may be considerabie local variation in recruitment dynamics.

WP SF 97/7 - Discussion D. Parsons

. Results of recent Campelen trawl surveys were compared to findings from more long-standing trap surveys. Discussion focussed on the underestimation of the small-clawed component using traps, the poor performance of trap surveys to predict CPUE except in Conception Bay, and the limited coverage by trap surveys within the bays except for White Bay. It was generally agreed that the trawl surveys give a broader perspective than trap surveys alone and that inferences on maximum exploitation rates and total mortality are possible using the results of the former.

Both inshore trawl surveys and Campelen trawl catches showed reduced recruitment in the 40 - 80 mm size range. These animals are 4 or more years from entering the fishery. It was suggested that a direct comparison of Campelen trawl catches and those using the "no name" trawl be made.

Past assessments pointed to the potential for using data on the proportion of old-shelled animals to make inference on exploitation rate. Although the per cent of old shells increased since 1972 (except in Conception Bay), the same trend was evident in both commercial sizes and sub-legals, raising the question of whether or not these data tell us anything about exploitation. It was acknowledged that shell classification is confusing and there was general agreement that shell condition, alone, tells nothing about exploitation. Alternatively, it might be more appropriate to look at the proportion of new shells as an indication of recruitment.

NORTHERN SHRIMP

Assessments of northern shrimp (Pandalus borealis) resources off eastern Newfoundland and Labrador WP SF 97/1-5

by

D. Parsons and P. Veitch

Data from the commercial fishery for northern shrimp were analysed for four assessment - management areas: Division 0B, Division 2G, Hopedale + Cartwright Channels and Hawke Channel + Division 3K. These correspond to shrimp fishing areas

(SFA's) 2, 4, 5 and 6, respectively. Within each area, inference on the status of the resource was made by examining trends in catch, effort, catch per unit effort, fishing pattern and size/sex composition of the catches. Also, multispecies research trawl surveys in 1995 and 1996 provided valuable information on distribution and abundance of shrimp over a wide area, particularly in Hawke Channel + Division 3K.

The northern shrimp fishery continued to perform well in 1996. Catch rates in the Hopedale + Cartwright and Hawke + 3K areas were as high as or higher than those observed since the fishery began. Research surveys showed that abundance/biomass was high in both areas, particularly in Hawke + 3K. In Division 2G, there was some concern for a decline in catch rates between 1994 and 1996 but the level still remains high compared to other fishing areas and a healthy spawning stock has been maintained. The status of the resource in Division 0B remains uncertain.

It was concluded that substantial increases in TAC's could be considered for the Hopedale + Cartwright and Hawke + 3K areas, based on fishery performance and research survey indices. A higher TAC also was advocated for Division 0B as a continuation of the "experimental" approach to fisheries development. There was no basis on which to advise an appropriate TAC for Division 2G.

WP SF 97/1-5 Discussion E.G. Dawe and G. Ennis

Fall Bottom Trawl Surveys

Most of the discussion centred around the limitations of the fall stratified random bottom trawl surveys for estimating shrimp biomass. The 1996 survey was more extensive than that in 1995 and included sampling in NAFO Div. 2GH. The biomass estimates in Hawke + Div. 3K were the highest and had relatively narrow confidence intervals (approximately $\pm$ 20%). Estimates from the other areas had broader confidence intervals which were attributed to poor coverage, especially in the north, as well as variable catches. A few very large catches profoundly affected biomass estimates. It was noted that much of the shrimp biomass was concentrated in a small portion of the survey area. The currently used stratified random survey design may not the most suitable for assessing such a patchily-distributed resource. Another concern with interpretation of trawl catches of shrimp related to diel variability in vertical distribution. It was noted that this distribution was variable in space and time, requiring real time monitoring possibly using acoustics, for incorporation into analysis of trawl catch data.

SFA 2

Questions were raised regarding seasonality in the catch and effort data and whether weighting was affected by aggregating the data for analysis in the multiplicative model used to standardise catch rates. Data are entered on a set-by-set basis and analysed to detect vessel/month/year effects. Inappropriate weighting is not a problem.

All of the fishery and biological indicators are positive and there is no sign that fishing at the 3500 t level has had any adverse effect. Industry feels there is much more shrimp available in the area. Although an increase in TAC seemed in order, there was no basis on which to suggest how large an increase might be appropriate. It was suggested that the increase be quite substantial to see if a fishery effect could be detected. Whether this could be rationalised was questioned. A more cautious approach seemed appropriate, however, because of the high degree of uncertainty regarding the changing distribution of high concentrations of shrimp in the area.

The lack of a shrimp harvesting strategy was noted and it was suggested a special meeting was needed to consider the issue. It was argued, however, that a more comprehensive understanding of shrimp population biology and dynamics was needed before such a meeting would be useful.

SFA 4

A drop in CPUE in 1995 and 1996 was evident and the multiplicative model suggested a significant seasonal effect. Although industry is concerned, it was considered that the drop might be due in part to a shift in fishing pattern. In this area the fleet is known to target large shrimp for high quality, high value packs at the expense of overall catch rate. The incidence of females in the catch remains high and research vessel catches were indicating good recruitment.

It was decided that additional analyses of the catch rate series were required to evaluate effects of various factors. The reanalyses confirmed the decline but its magnitude was reduced. It was decided there was no basis for suggesting a change to the present TAC.

The question was raised as to how the shrimp biomass estimates from the new, multispecies surveys should be used in generating advice. It was suggested that we would have to address using them in some structured, analytical way at some point in time. It was argued that this would imply long-term stability in shrimp stocks making it possible to manage on a sustainable yield basis. However, our understanding of the changes in shrimp abundance and distribution that have occurred is too limited for this to be practical at this time.

SFA 5

Catch rates have been increasing in this area. Given that biomass is underestimated to a fair degree anyway, the rationale for dropping two very large survey sets from the 1996 estimate was questioned. If the purpose is to reduce variance, it was pointed out that this could also be achieved by eliminating very low catches. It was noted too that any rationale for eliminating survey sets with very high catches could also apply to those with zero or very low catches.

SFA 6

The expanded distribution and increased abundance of shrimp in recent years has been quite pronounced for this area. Fishery removals are negligible in relation to the estimated biomass. The recent changes occurred at the same time as shifts in environmental conditions and with reduced abundance of predators, however, clear linkages have not been established. It was agreed that these changes in shrimp populations and their possible causes should be summarised in a separate section at the end of the SSR.

ICELAND SCALLOPS

Grand Banks

The 1996 Iceland scallop fishery in NAFO Div. 3LNO - WP SF 97/12

by

Naidu, K.S., F.M. Cahill, P.J. Veitch, and E.M. Seward

There were no research surveys for scallops in this area in 1996. In the absence of new research information, it was possible to examine fishery performance data only.

Overall, with the exception of 3LN north, catch rates have remained stable over the past several years. However, there has been an increase in meat counts i.e. smaller scallops are being harvested. There is no basis on which to advise changes in TAC. The TAC's currently are 1,000 t round for eastern 3L, 3,000 t for the Lilly/Carson Canyon area and 3,000 t for the 3LN area just north of the canyons. A new fishing area in southern 3N developed in 1996. Based on estimated suitable scallop habitat in this area (3Nf) relative to the Lilly/Carson Canyon area, a TAC of 800 t round would be appropriate.

Recent exploratory work on the Flemish Cap suggests that further expansion of the fishery eastwards is highly unlikely.

WP SF 97/12 Discussion D. Taylor

Estimates of M_1, fishery induced mortality, are based on the numbers of cluckers encountered during surveys. While the incidence of cluckers may serve as a rough indicator of fishing mortality it must be considered a minimum estimate because cluckers become disarticulated after an average of 210 days. Research surveys, however, are conducted annually and may not be synchronous with the fishery which means that cluckers produced by fishing activity may become disarticulated before research surveys can enumerate them. In any case sampling activity in 1996 was minimal with a very small sample size.

Effort was displaced from the Lilly/Carson Canyon (LCC) southward to a new area, 3NF , which produced high catch rates and low meat counts. Meanwhile, traditional fishing grounds in LCC recorded declines in CPUE of 30% with an attendant increase in meat counts.

Exploratory survey activities conducted on the Flemish Cap in 1996 yielded nothing, indicating that expansion of the fishing grounds in the Grand Banks area may have reached its limit.

4R Strait of Belle Isle

Synopsis of the 1996 fishery for Iceland scallops in NAFO Div. 4R (Strait of Belle Isle) - WP SF 97/13

by

Naidu, K.S., F.M. Cahill, P.J. Veitch, and E.M. Seward

There were no research surveys for scallops in this area in 1996. In the absence of new research information, it was possible to examine fishery performance data only.

In spite of the lack of evidence of appreciable recruitment in the 1995 research vessel survey, commercial catch rates have been maintained over the last few years, most likely as a result of exploiting new aggregations consisting of old scallops. The fishery continues to operate over areas that are also nursery grounds for scallops, possibly impairing recruitment. With low recruitment there is little potential for growth in the standing stock. It is recommended that the TAC in 1997 not exceed the 1996 level of 1200 t round.

WP SF 97/13 - Discussion J. Morgan

The catch history of this stock has always reflected markets and availability of alternative fishing opportunities not just the abundance of scallops. The lack of a research vessel survey in this area in 1996 made it difficult to update the assessment. CPUE in the fishery improved slightly. These factors provided no basis to change the recommendation from last year.

LOBSTER

Review of the Newfoundland Lobster Fishery - WP SF 97/14

by

G. P. Ennis, P.W. Collins, D.G. Badcock, and G. Dawe

. Newfoundland lobster landings since the 1950's show a downward trend from a high around 2498 t in 1955 to a low around 1238 t in 1972. The trend reversed during the 1970's and by 1979 landings had increased to 2592 t. A long-term (since 1905) high of

3207 t was reached in 1992 but landings have been declining in recent years (2413 t in 1996). While timing and magnitude of changes have varied between areas and regions, this general pattern is a feature of fisheries more or less throughout the range of the species. Their widespread occurrence suggests that these long-term landings trends are driven by broad-scale changes in recruitment associated with changing environmental/ecological conditions.

A limited entry licensing policy implemented in 1976 lead to a reduction in licences from around 6000 to 3800 in 1997. Registered traps increased from 0.74 to 1.2 million (in 1992) but has been declining in recent years with reductions in trap limits in some areas. The consensus was that the number of traps actually used was substantially in excess of the number allowed and effective fishing effort increased to an even greater extent.

Long-term fishery and population monitoring at Arnold's Cove, Placentia Bay, St. Chads-Burnside, Bonavista Bay, and Comfort Cove, Notre Dame Bay provide tag-recapture estimates of exploitation rate that regularly exceed 85-90%. Average seasonal catch rates are generally quite low (<0.4 commercial lobsters per trap haul) but highly variable. Catch rates are usually highest early in the fishing season, even though bottom temperature and lobster catchability are low, and decline rapidly as the season progresses. However, departures from this pattern are commonly caused by anomalous temperature, weather and ice conditions and changing fishing patterns.

Size frequencies from dockside and at-sea commercial catch sampling show that most of the landings are in the recruit size range (81-93 mm for males, 81-90 mm for females). Also, commercial lobsters are almost completely removed from populations in some areas over the course of the fishing season.

Detailed analyses of various components of the data and time-series estimates for Arnold's Cove lobsters provide results that are considered generally representative of Newfoundland lobster populations. Growth overfishing is characteristic of lobster fisheries. Results indicate that yield per recruit could be increased by as much as 27%, however, the increase in size limit and/or reduction in exploitation rate required would mean a substantial reduction in catch in the year a change is implemented. Egg production per female recruit could be more than doubled with much more moderate shifts in the management regime than would be required to maximise Y/R. Fluctuations in standing stock estimates for the Arnold's Cove population closely mirror those in Placentia Bay landings indicating that changes measured in localised populations reflect fluctuations in abundance on a much broader scale. Recruitment to the standing stock has been estimated and total annual egg production in the population derived for the 1976-96 series. Using a 9-year lag between egg production and subsequent recruitment, the 12 data points indicate an asymptotic stock-recruitment relationship with a very steep ascending limb near the origin.

Arnold's Cove population estimates have been used to define the limiting levels of exploitation beyond which the risk of recruitment overfishing is high. The approach is based on the concept that the recruits of one generation must, on average, produce enough eggs to replace their parental generation. The threshold for replacement is represented by a line through the origin of an egg production (i.e. stock) - recruitment (to the adult population) relationship with slope equal to the median survival ratio derived from the data. The number from an egg per recruit analysis whose reciprocal yields the same survival ratio identifies the exploitation rate beyond which recruitment can be expected to decline because of inadequate egg production.

Estimates of recruitment to the adult population were generated from the Arnold's Cove standing stock estimates. The median survival ratio from the resulting E-R data corresponds to an E/R level of 2.5% of what it would be if the population were unfished. At a nominal 90% exploitation rate the E/R level is estimated at 4.2%. This suggests that exploitation rate may exceed 90% without risk of recruitment overfishing. While a very high resilience to fishing is apparent, a number of considerations indicate that a more cautious interpretation of the results is warranted. A prudent conclusion suggests that recruitment failure is likely to occur during periods that environmental/ecological conditions affecting survival to recruitment are less than favourable.

WP SF 97/14 - Discussion J. Morgan

About 60% of the egg production is by lobsters below the legal size. There are also some large lobsters that have escaped the commercial fishery. It would be desirable to have a broader size/age range of lobsters contributing to egg production. Much of the changes that have occurred in landings appear to be driven by recruitment changes associated with natural events. Management measures can perhaps buffer these changes and limit their scope, but probably can not totally prevent them.

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Progress on Research Recommendations for 1996

Crab

1. Shell condition of crabs should continue to be monitored. The proportion of old shells among the prerecruits may be useful in developing an estimate of natural mortality while the proportion of old shell crab among the commercial sized individuals gives an indication of the rate of exploitation and the age of the standing stock. Along with the continued monitoring of shell condition the requirement for a more detailed staging system should be investigated.

The proportion of old shelled crabs among prerecruits showed similar trends to that among commercial crabs, suggesting that this would not be useful as an indication of exploitation rate. A common staging system has been adopted for the Region, which will allow crabs which molted in the current year (white crab) to be distinguished from recruited crabs with high meat yield. The percentage of white crab should give an indication of recruitment.

2. With much of CPUE data now computerised, catch rates in specific areas such as historic fishing grounds, as well as specific fleet sectors, should be more closely examined. This may make the interpretation of CPUE in a rapidly changing fishery more meaningful.

No progress.

3. Further spatial analyses of abundance, distribution by carapace width, claw size etc. from the RV bottom trawl surveys should be attempted.

Spatial distribution was presented for all crabs as well as for various size groups of males.

4. There is still a requirement for the development of an optimum sampling design for combining large and small mesh pots in the RV trap surveys. A formal request for work in this area should be made to the CODE.

No progress.

5. The appropriate level of subsampling of log book data should be determined. A formal request for work in this area should be made to the CODE.

Subsampling is no longer necessary, because all the logbook data are keypunched by Statistics Branch.

6 Although great strides have been made in computerising the log book information this has not been completed. The remainder of the historical log books as well as all future log book information should be computerised.

No progress with the historical data because of lack of funds. Current logbook data are now adequately keypunched by Statistics Branch.

7. The selectivity of the Campelen bottom trawl for small crabs should be investigated, perhaps by comparing the catch of the Campelen with the catch from a Nephrops trawl. Any experiments on this subject should be discussed first with the gear technologist.

Size frequencies produced from Campelen trawl data were essentially similar to those produced from the Shamook trawl data, for Div. 3L, 1996. In 1997, efforts will be directed toward comparing these trawls on common stations.

8. The synchrony between year classes in different areas in Atlantic Canada should be examined as well as any possible relationship between year class strength and environmental factors.

A paper was tabled which addressed these issues. It was suggested that year class strength may be directly related to upper layer water temperature during the larval period.

Scallops

9. A formal request should be made to Statistics Branch to apply species specific conversion factors from meat weight to round weight for scallops. For Iceland scallops the proper conversion factor is 9.2 and for sea scallops it is 8.3. Statistics Branch currently uses the 8.3 conversion factor for Iceland scallops which results in an under estimation of the total catch.

Statistics Branch now applies the correct conversion factor of 9.2.

10. There is no in house expertise in ROXANN, all the analyses to date has been done under contract or by term employees. Such in house expertise should be developed.

No progress

11. During research surveys and as part of fishery monitoring, data necessary to detect changes in starfish abundance in the main scallop fishing areas on the Grand Banks should be collected.

There were no scallop directed surveys in this area in 1996.

Shrimp

12. The current CPUE model should be investigated with respect to the weighting of the catch rate by area to ensure that areal weightings are incorporated.

Segregated CPUE analyses by area showed the same trends as the multiplicative models which include area as a class variable.

13. Biomass estimates from the fall RV surveys should be produced in a number of ways, for example, including only areas that are commercially fished or only including areas with catch/tow equal to or greater than the minimum viable commercial catch rate.

Biomass estimates were produced by sex, thereby separating recruitment (males) and fishery (females) components. Estimates were also produced for the commercial fishing grounds (i.e. 300-500 m).

14. The trawl acoustics committee should review the use of acoustics for shrimp assessments. They should specifically examine:

a) The need for dedicated vessel time in the spring of 1997 to examine in situ target strength. This will require the ability to collect acoustic data and conduct fishing.

b) The use of both 120kHz and 38kHz acoustic systems on the TELEOST stern deployed towed body at the same time.

c) Review and determine the status of the proposal submitted to the ADM priority funding to look at the identification of and optimisation of shrimp acoustic signals to better distinguish shrimp from other targets.

The hydroacoustics committee examined these issues. As well, some work was attempted in January 1997 but limited time, poor weather and ice resulted in minimal success.

Research Recommendations for 1997

Shrimp

1. Surveys in 2GH should continue for shrimp, but with better coverage. There is little information for this area other than the fishery and the development of a survey index would be a valuable assessment tool.

2. The sampling design of the fall bottom trawl surveys should be re-examined in light of their multispecies nature. As well, the acquisition of a data collection system for the EK-500 to be used during these surveys should be examined.

3. SPANS should be applied to commercial CPUE data for 1995 and 1996 and compared to the fall survey results to examine the potential of analysing the entire CPUE series with SPANS. This could provide a biomass time series from 1980 to present.

4. The feasibility of involving industry in a program to provide standardised CPUE data in 0B should be pursued. This would provide information on an area where there is no survey and provide some consistency in the spatial coverage of the CPUE index from year to year.

5. There should be a Zonal shrimp meeting to determine the appropriate exploitation strategy for this species.

Crab

6. The number of small and large clawed crabs in the trap surveys should be examined as mean number per trap.

7. Information should be gathered on the 3Ps bottom trawl surveys.

8. Observer data should be examined for size and discards on a yearly basis.

9. The development of an index fisher program should be consider to provide a CPUE series that is more easily interpreted. As well the observer data should be examined relative to the log book information to aid in CPUE interpretation.

10. The incidence of bitter crab disease should be examined in both trawl and pot surveys.

Scallops

11. Port sampling for meat count in 4R is inadequate and should be improved. There is also very little sampling for shell height which needs to be done at sea.

Working Papers Available to the Meeting

WP SF 97/1 Parsons, D.G. and P.J. Veitch. Assessments of northern shrimp (*Pandalus borealis*) resources off eastern Newfoundland and Labrador: Introduction. 13 pp.

WP SF 97/2 Parsons, D.G. and P.J. Veitch. Assessments of northern shrimp (*Pandalus borealis*) resources off eastern Newfoundland and Labrador: Division 0B, SFA2. 7 pp.

WP SF 97/3 Parsons, D.G. and P.J. Veitch. Assessments of northern shrimp (*Pandalus borealis*) resources off eastern Newfoundland and Labrador: Division 2G, SFA4. 13 pp.

WP SF 97/4 Parsons, D.G. and P.J. Veitch. Assessments of northern shrimp (*Pandalus borealis*) resources off eastern Newfoundland and Labrador: Hopedale + Cartwright, SFA5. 15 pp.

WP SF 97/5 Parsons, D.G. and P.J. Veitch. Assessments of northern shrimp (*Pandalus borealis*) resources off eastern Newfoundland and Labrador: Hawke + Division 3K, SFA6. 18 pp.

WP SF 97/6 Taylor, D.M. and P.G. O'Keefe. Results of 1996 Inshore/Nearshore snow crab time-series research cruises. 25 pp.

WP SF 97/7 Dawe, E.G., D.M. Taylor, P.J. Veitch, H.J. Drew, P.C. Beck, and P.G. O'Keefe. Status of Newfoundland and Labrador snow crab in 1996. 29 pp.

WP SF 97/8 Dawe, E.G., D.M. Taylor, and E. Colbourne. Factors affecting snow crab yearclass strength in the Newfoundland region. 20 pp.

WP SF 97/9 Taylor, D.M. and P.G. O'Keefe. Summary of performance of the 1996 Newfoundland and Labrador snow crab fishery. 45 pp.

WP SF 97/10 Parsons, D.G. Multiplicative analyses of shrimp CPUE with and without weighting by effort. 4 pp.

WP SF 97/11 Dawe, E.G. and H. J. Drew. Frequency distributions by claw type, size and division for crab caught during the 1995 and 1996 fall bottom trawl surveys accounting for survey design. 13 pp.

WP SF 97/12 Naidu, K.S., F.M. Cahill, P.J. Veitch, and E.M. Seward. The 1996 Iceland scallop fishery in NAFO Div. 3LNO. 31 pp.

WP SF 97/13 Naidu, K.S., F.M. Cahill, P.J. Veitch, and E.M. Seward. Synopsis of the 1996 fishery for Iceland scallops in NAFO Div. 4R (Strait of Belle Isle). 13 pp.

WP SF 97/14 Ennis, G.P., P.W. Collins, D.G. Badcock and G. Dawe. Review of the Newfoundland lobster fishery. 33 pp.

Review of the

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